domestic products involved. If, however, the quotations in April 1922 are compared with those in September 1921 for the same fifty typical materials t is found that, of the forty-six listed in the earlier catalogue, the price of twenty-four is unchanged, the price of twenty is reduced, whilst in two cases only has it been increased.

The question of quality obviously does not admit of discussion on a quantitative basis, but it will be recalled that even the long-established German firms were obliged to acknowledge sporadic blunders, and only the chemist who himself has never failed in preparing an organic material of the highest grade is entitled to withhold mercy, not to mention justice, from those manufacturers who have endeavoured to meet domestic requirements by covering a wide range as rapidly as possible. Surveyed generally, the British quality reaches a high standard.

Moreover, the range now offered is commendable. The organic chemist, particularly in the opening phases of an investigation, sometimes requires relatively obscure compounds in quantities of a few grams at a time, and the convenience of a British price-list comprising 2500 individual substances for use in research or analysis approaches, within a praiseworthy distance, the advantages offered by Kahlbaum and Schuchardt. There is no finality to such a list, which can receive additions when requirements are made known. Even the research chemist who has been mesmerised by the multitude and cheapness of German products, and by pre-war facilities for obtaining them must, on reflection, realise the burden which would be placed on a new industry by stocking every conceivable material, a large proportion of which would not be wanted for years to come. Finally, it should be represented that if the spell of German chemical superiority is ever to be broken, one factor in its dispersal is the demonstration, to successive relays of native students, that it is possible to produce in this country chemical materials of good quality and at reasonable prices. Moderate self-denial and exercise of fair-play during the next few years appear to be the principal equipment required in achieving this most desirable end.

M. O. F.

Northernmost Greenland.

Greenland by the Polar Sea: The Story of the Thule Expedition from Melville Bay to Cape Morris Jesup. By Knud Rasmussen. Translated from the Danish by A. and R. Kenney. Pp. xxiv + 327 + pls. and maps. (London: W. Heinemann, 1921.) 36*s.* net.

MR. KNUD RASMUSSEN occupies a unique place amongst polar explorers because, as the son of a Danish pastor in Greenland, he spent the first fourteen years of his life amongst the Eskimo, knowing their language like his own and entering into their modes of life as to the manner born. There was thus nothing strange or repulsive to him in the diet, the clothing, or the housing of the Eskimo, and after his education at the University of Copenhagen, he turned to the exploration of Greenland and the study of its people as naturally as a seal takes to the water.

In 1903–4 Mr. Rasmussen sojourned as a member of the Danish Literary Expedition among the "Arctic Highlanders," first discovered by Sir John Ross in 1818 and made familiar to English readers by Peary's repeated winterings. In 1910 Rasmussen established a station named Thule on the shore of Wolstenholme Sound, nearly in 77° N., and from this centre he made his "First Thule Expedition" in 1912–13; he crossed the inland-ice to the north-east, and proved that Peary was in error when he supposed that his Independence Bay was on a channel which cut off northernmost Greenland as an island. Rasmussen's intention had been to return to Thule along the west coast of Greenland from its most northerly point, but circumstances compelled him to go back by the way he came. An attempt to repeat the journey in 1914 failed, and the purpose of the book now under review is to describe the journey northward along the west coast which was carried out in 1917. The motive of the expedition was ethnographical—the discovery of the route by which the great Eskimo migration entered Greenland, and it was only preliminary to a greater journey, not yet completed, along the north coast of America.

The range of the journey is stated on the title-page as "from Melville Bay to Cape Morris Jesup," but was really less, as De Long Fjord was its termination. None of the ground traversed on the outward journey was new in the sense of first discovery, for the whole coast had been charted from the sea by expeditions which had forced their way through Smith Sound and the channels to the polar ocean, while sledge parties from Nares' expedition onwards had skirted much of the coast.

The interest of Rasmussen's journey lies in its methods as much as in its results. He was accompanied by two Scandinavian men of science—Dr. Koch, a Danish geologist, and Dr. Wulff, a Swedish botanist. There were also four Eskimos, and when the expedition started from Thule on April 6, 1917, it had 6 sledges and 185 dogs. The expedition carried a minimum of European stores and equipment so as to travel quickly, and beyond luxuries such as cocoa, tea, sugar, prepared oats, biscuits, and pemmican, all food was to be obtained by hunting.

The first day's journey was 94 kilometres, accomplished in ten hours, a magnificent performance on the sea-ice, which was never equalled afterwards; as the distance is inadvertently given as "94 miles," the casual reader might suspect the author of romancing; but no explorer ever recorded his exploits more modestly. In many particulars it is a little difficult to follow the narrative, for the author is frequently obscure and discursive in his general statements, and the translator has been sorely troubled by the rendering of scientific terms. The reader may indeed feel a glow of justifiable satisfaction when he reasons out that the piece of apparatus designated a "cooking barometer" must be neither more nor less than a boiling-point thermometer! Also it takes time to accustom oneself to the one word "mountain," applied equally to mean mountain, hill, or knoll.

One has not to read far, however, before the narrative grips the attention, and the difficulties of style and terminology do not disguise the fact that Rasmussen travelled with the inherited skill and resourcefulness of the Eskimo and the insight of a man of science.

A series of helpful sketch-maps for each section of the journey is provided as well as an excellent general map. The route of the expedition ran north through Smith Sound, Kane Basin, Kennedy Channel, Hall Basin, and Robeson Channel on the sea-ice or the ice-foot, closely following the Greenland coast, stopping to hunt and gorge on seals, reindeer, musk-oxen, hares, or ptarmigan where game abounded, pushing forward desperately over the barren country, where the dogs had to be fed on their weakest comrades. At length on June 21, 1917, they reached the entrance to De Long Fjord in 83° N. and faced the problem of the return. The easy travelling of spring was past. It was impossible to move quickly over the thawing sea-ice; the sledges could not be dragged across the bare, stony coastlands with their sparse growth of the brilliant Arctic flora, and it was necessary to find a way up to the distant inland ice and to lay in a store of food for the long march over the empty snow-fields. A find of 24 tins, each containing 9 lb. of New Zealand mutton, left by the Nares expedition in 1875, before any of Rasmussen's party was born, had given occasion to much feasting on the way north, for the meat was as good after 42 years as if freshly tinned. One cannot help thinking that such a windfall of portable food might have been saved for the inland-ice journey; but the Eskimo rule of unlimited feeding when food is available appears to have been faithfully carried out.

It was the end of July before the party had got back to St. George's Fjord in 82° N. with all the fresh meat they could collect, and on August 4 they succeeded in ascending the glacier at the head of the fjord on to the inland-ice, with only 17 dogs remaining. Their supplies allowed only 12 days for making the journey to Cape Agassiz, south of the Humboldt Glacier. There they hoped to replenish their food supplies by hunting. One of the Eskimos had been lost in St. George's Fjord, they were all weak, and Wulff was very ill. It was 20 days before they reached the sea in a starving condition, all the dogs having been eaten. Rasmussen, with the strongest Eskimo, left the others and hurried southward along the coast, but by the time he met the native hunters and could send back supplies, Wulff had died. It is impossible to read of the hardships all had undergone without realising that the dangers of following Eskimo practice are very nearly equal to the advantages. It was October 22, 1917, when the survivors returned to Thule.

The scientific results of the expedition were substantial, and may to some extent be gathered from the narrative and the appendices. The map has been rectified in many particulars and the outlines of several fjords laid down for the first time. The extent of the ice-free land where life is possible has also been mapped in considerable detail. This lies between the sea-ice which never leaves the coast and the inland-ice which occupies the high land of the interior. The geology has been studied, and Koch is of opinion that the folded mountain system of the extreme north of Greenland is an extension of the Caledonian fold, which curves westward from Norway through Spitsbergen and continues westward of Greenland into Grinnell Land. Some interesting notes on air temperature are also given.

Dr. Wulff left valuable notes on the flora, including the observation that flowers formed one summer survived the cold of winter and matured in the second summer. The habits of the musk-ox are further elucidated and illustrated by excellent photographs, while there are many notes on insect life, the most curious being the appearance of enormous swarms of bluebottles, which make it almost impossible to keep meat killed in summer for more than a day or two in 82° N. The most important result, however, is the light thrown on the migrations of the Eskimo. Mr. Rasmussen has satisfied himself that they came from America, passed through Ellesmere Land, crossed Smith Sound, and moved down the west coast of Greenland, round Cape Farewell, and up the east coast. He is certain that they could not have reached the east coast by the shorter route along the north coast of Peary Land, which he thinks was never inhabited, and can never support human life.

The author refers in terms of generous appreciation to his predecessors of all nationalities, and amongst the most interesting illustrations are facsimiles of the letters deposited in cairns by parties of the Nares and Greely expeditions. The English version of the book is appropriately prefaced by an appreciation of the author's work by Sir Lewis Beaumont, who himself did heroic service in leading one of the sledge parties from the *Discovery* nearly half a century ago.

HUGH ROBERT MILL.

Modern Tendencies in Physiology.

(1) *Practical Physiological Chemistry.* By Dr. J. A. Milroy and Prof. J. H. Milroy. Third edition. Pp. ix+449+ii pls. (Edinburgh: W. Green and Sons, Ltd., 1921.) 21*s.* net.

(2) *Biological Chemistry.* By Dr. H. E. Roaf. Pp. xvi+216. (London: Methuen and Co., Ltd., 1921.) 10*s.* 6*d.* net.

(3) *An Introduction to Biophysics.* By Dr. D. Burns. Pp. xiii+435. (London: J. and A. Churchill, 1921.) 21*s.* net.

THE curricula of most universities represent Natural Science as being made up of a number of subjects: geology, mineralogy, chemistry, physics, zoology, botany, human anatomy, and physiology, astronomy being grouped rather with mathematics than with natural science. Twenty years ago such a classification represented not only the scaffold on which the standard of departmental teaching and examination was erected, but it also represented the current conception of the limits between subject and subject. Where will these limits be twenty years hence? Everywhere the boundaries are disappearing; the physicist has made far-reaching additions to the basal conceptions of chemistry, the zoologist has largely forsaken animal morphology for fatherless frogs and the inheritance of sex characteristics. Of no department of science have the boundaries become less distinct than they have of physiology. One phase of the change which is taking place is emphasised by the publication of the three books, the titles of which stand at the head of the present article.

(1) "Practical Physiological Chemistry" written jointly by Prof. J. H. and Dr. J. A. Milroy, has already had a long and honourable career, and is now in its third edition. It represents the first phase in the change—that in which organic chemistry commenced to play a prominent part in physiology. In the present edition considerable additions have been made, especially in the direction of physical chemistry, but the book essentially stands for what it always did, namely, for physiology seen from the angle of the organic chemist, and as such its value is fully maintained.

(2) Dr. Roaf's book, "Biological Chemistry," represents a much more fundamental change. It deals with something wider than the mere chemical aspect of vertebrate physiology. As its title suggests, it embraces the chemical aspect of life generally, hence it includes not only invertebrate physiology, but botany in its bracket. The subject-matter of the book, therefore, covers parts of what formerly were regarded as three biological subjects, namely, physiology, zoology, and botany. It inevitably raises the question, "What are the real boundaries of physiology?" The question is a vital one in the teaching of science and medicine. Concrete instances of the transition which is taking place may be found in the organising of any medical school, and that of Cambridge may be cited as an example. Just before the war, the department of physiology was reorganised, a new laboratory was erected with much greater accommodation than the old one, yet at the same time experimental psychology and biochemistry were both recognised as new subjects and given laboratories of their own. In Manchester, where the subject of physiology has also been reorganised, the cleavage has taken place at a different point. Biochemistry remains a part of the subject, but histology has been handed over to the department of anatomy. What then remains as the essence of physiology? If it is to lose histology, experimental psychology, including a large part of the study of the organs of special sense, and biochemistry, what is to remain? What justification is there for a department of physiology at all?

In discussing this matter a couple of years ago, a well-known physiologist took up the position that what remained was biophysics. Turning then to Dr. Burns's volume (3), "An Introduction to Biophysics," it was a matter of peculiar interest to ascertain the extent to which it bore out the definition of being what remained of physiology after that subject had parted with biochemistry and experimental psychology.

Dr. Burns's book—incidentally we would remark that it is very nicely got up, being pleasant both to hold and to read—will well repay perusal, and should be read by both teachers and the more reflective class of students. The title of the book, however, seems to embrace less than the covers, but even granting that there is more in the book than is legitimately covered by the term biophysics, there still remains much of physiology which is not there.

The question then, what is left of physiology after biochemistry, biophysics, and experimental psychology have been taken from it, remains unanswered. The answer in our view is simply this—physiology remains. Biochemistry and biophysics are the apparatus of physiology, but they are not physiology. To the physiologist they are all-important, for to him every advance which is made in biochemistry is vital, because it gives him a new machine with which to explore his own department of knowledge.